

Remarks

Applicants are submitting this Preliminary Amendment with a check and Request for Continued Examination. If there are further outstanding fees, Applicants authorize the Examiner to charge account number 19-4516.

The Examiner objected to the oath as being defective. Applicants submit a newly executed oath stating the serial number and filing date without alterations to the addresses to overcome the objection.

The Examiner objected to claim 2 under 35 U.S.C. §112 as being indefinite. Applicants amended this claim to overcome the rejection.

The Examiner rejected claims 1-3, 9-11, and 14 under 35 U.S.C. §102 as being anticipated by U.S. Patent No. 4,900,405 to Otagawa ("Otagawa"). The Examiner rejected claims 1, 2, 5, 6, and 9-11 under 35 U.S.C. §103 as being obvious by U.S. Patent No. 5,716,506 ("Maclay") in view of Otagawa.

Applicants' claims 1 and 9 require a first cell in communication with a second cell. Each cell has a substrate with a surface, a sensing electrode and a counter electrode being spaced from one another and deposited on the surface, and an electrolytic film having a thickness and covering said sensing electrode for increasing a contact area between the film, sensing electrode, and gas to be detected. Claims 1 and 9 also require an electrolytic material in contact with the sensing electrode and having a thickness larger than the thickness of the electrolytic film, a reservoir in contact with the electrolytic material, and a solution in the reservoir for hydrating the electrolytic material.

Applicants' film has a thickness and covers the sensing electrode for increasing a contact area between the film, sensing electrode, and gas to be detected. The film is

thin so that gas may quickly diffuse through it and contact the sensing electrode in order for gas to be measured. However, because the sensing electrode needs to be wetted in order to enhance sensor sensitivity, the thicker electrolytic material is provided to act as a sponge to retain wetness and, because of it being in contact with the sensing electrode, the sensing electrode is also wetted. Because the electrolytic material is thicker than the thickness of the film, the electrolytic material is capable of absorbing more electrolyte solution from the reservoir and providing lasting hydration to the sensing electrode. The film's thickness is optimal for permitting gas diffusion but may be too thin to absorb and retain electrolyte solution and, if wetted too much, may permit flooding at the sensing electrode surface.

Otagawa does not show both an electrolytic material in contact with a sensing electrode and a thinner film for increasing the contact area between the film, sensing electrode, and gas or that the thickness of the film is less than the thickness of the electrolytic material, both of which are required in Applicants' claims 1 and 9. Because all elements of Applicants' claims 1 and 9 are not disclosed, Applicants submit the rejections with respect to Otagawa be withdrawn under 35 U.S.C. §102.

Maclay also does not disclose, teach, or suggest both an electrolytic material in contact with a sensing electrode and a thinner film for increasing the contact area between the film, sensing electrode, and gas. Maclay lacks any teaching or suggestion for an electrolytic material in contact with the sensing electrode for wetting the sensing electrode. Maclay also lacks any teaching or suggestion for the thickness of the electrolytic material to be thicker than the thickness of the film. Without any electrolytic material, there is no adequate structure to absorb electrolyte solution to hydrate the sensing electrode. Further, if wetted, Maclay's sensing electrode may be flooded.

Therefore, even a combination of Maclay and Otagawa would still not arrive at Applicants' invention without modification to the combination. A combination of Maclay and Otagawa may result in a sensor with two cells and with two electrodes deposited on a substrate where each electrode has a film but without any thicker electrolytic material also in contact with each sensing electrode. Another combination may be a sensor with a reservoir for hydrating the sensing electrode without both an electrolytic film and a thicker electrolytic material, both of which are in contact with the sensing electrode.

In order for a combination of references to be properly modified under 35 USC 103, there must be some teaching or suggestion in the references to make the modification. Because both Otagawa and Maclay do not relate to a film covering the sensing electrode for increasing the contact area between the film, sensing electrode, and gas and a thickness of the film being less than a thickness of the electrolytic material that also contacts the sensing electrode, there is no motivation for one skilled in the art to modify the combination to include Applicants' electrolytic film and thicker electrolytic material. Based on the foregoing, Applicants submit the rejections under 35 USC 103 should be withdrawn.

The Examiner also rejected claim 16 under 35 U.S.C. §103 as being unpatentable over in view of U.S. Patent No. 647,364 ("Mase").

Applicants' claim 16 requires an electrode operating as both a counter and reference electrode. Claim 16 also requires a first sensing electrode and a second sensing electrode spaced apart from the electrode that operates as both the counter and reference electrode.


Mase relates to an electrode 12 that operates as a pumping electrode and a measuring electrode. Mase's pumping electrode pumps oxygen out. Col. 8, lines 46-50. Mase's measuring electrode is the sensing electrode.

Applicants' counter and reference electrode is not used for pumping or as a sensing electrode. Applicants' claim 16 is not merely claiming an electrode capable of two different functions, but more specifically claims it is both a counter electrode and a reference electrode. Also, Applicants' sensing electrodes are separate from the counter and reference electrode. Therefore, Applicants' counter and reference electrode cannot also be a sensing electrode because it would be redundant of Applicants' two sensing electrodes.

Since Mase does not disclose, teach, or suggest an electrode operating as both a counter and a reference electrode, but instead teaches a combined pumping and sensing structure, Applicants respectfully submit that Mase does not render the counter and reference electrode of Applicants' claim 16 obvious.

Based on the foregoing, Applicants submit claim 16 is allowable over the cited references.

Respectfully submitted,



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